39. (Amended) The system of claim 28, wherein the computing means treats the image as a linear combination of at least two low-resolution functions and deriving the unknown high-resolution voxel values from the image data of the first and second pluralities of slices.

REMARKS

At the outset, the Examiner is thanked for the courtesy shown during the telephone interview conducted July 15, 2002. During the interview, various proposed claim language was discussed.

Should this supplemental amendment cross in the mail with an Office Action, as defined in MPEP (8th Ed.) §714.05, last paragraph, i.e., it is filed on or before the mailing date of such an Office Action, issuance of a supplemental Office Action under that paragraph is respectfully solicited.

In the present amendment, various changes have been made to the claims to define more particularly over the prior art. More specifically, claim 1 has been added to highlight patentable features of the invention. Claim 11 has been canceled. Claim 12 has been amended to conform to amended claim 1. The corresponding changes have been made to claims 28, 38 and 39. The changes find support in the originally filed disclosure as indicated below:

Claim 1, preamble: Page 3, lines 11-13; page 10, lines 11, and 12.

Claim 1, step (a): (direction relative to subject) Page 5, lines 4-13; Fig. 1; (low and high resolutions) page 10, lines 14-19; Fig. 6A; claim 11, lines 2 and 3.

Claim 1, step (b): (direction relative to subject) Page 5, lines 4-13; Fig. 1; (low and high resolutions) page 10, lines 14-19; Fig. 6B; claim 11, lines 4 and 5.

Claim 1, step (c): Page 10, lines 19-21; Fig. 6C.

Claim 1, step (d), and claim 12: Page 10, line 22, through page 11, line 4.

The corresponding changes to the system claims find support in the same locations in the originally filed disclosure.

For the reasons set forth below, the Applicants respectfully submit that the amended claims define subject matter that is patentable over the prior art.

The present invention seeks to solve for unknown high resolution voxel values associated with isotropic voxels from the lower resolution scans (these are lower resolution because of the slice thickness problem). An illustrative example is shown schematically in Figs. 6A-6C, where Fig. 6C shows a case where the slice thickness is 4 times the in plane resolution, and where 4 pixels of one slice and 4 of an orthogonal slice result in a large number of unknown high resolution isotropic voxels. The present invention involves a solution for these unknown values of the high resolution isotropic voxels.

In comparison, *Freundlich et al* Fig 4 and the discussion thereof in the reference clearly show no means for creating high resolution isotropic voxels. Instead, the technique taught by the reference retains the low resolution of the slice thickness; this is clearly shown in Fig 4 and the related discussion.

Maier et al does not overcome that deficiency of *Freundlich et al.* *Maier et al* is clearly concerned with selective excitation and readout of MRI signals derived from a volume formed by the intersection of two planes, as shown in their Figs 3 and 9 and related discussions. They do not suggest a solution method for unknown isotropic high resolution voxels. The relationship between their intersected volumes and their slice thicknesses are explicitly shown in their Fig 6, and there is no suggestion of solving for higher resolution subvolumes.

Thus, the present claimed invention is not anticipated by either of the applied references would not have been obvious over the applied references, whether those references are considered separately or combined as proposed in the Office Action.

If any questions remain that can be addressed through a telephone communication, the Examiner is invited to telephone the undersigned at the telephone number set forth below.

Please charge any shortage or credit any overpayment of fees to BLANK ROME COMISKY & MCCAULEY LLP, Deposit Account No. 23-2185 (000687.00138). In the event that a petition for an extension of time is required to be submitted herewith and in the event that a separate petition does not accompany this Response or is insufficient to render this Response timely, the Applicants hereby petition under 37 C.F.R. §1.136(a) for an extension of time for as many months as are required to render this submission timely. Any fee due is authorized above.

Respectfully submitted,

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AMENDED CLAIMS MARKED TO SHOW CHANGES

1. (Amended) A method of forming an isotropic, high-resolution, three-dimensional image of a subject, the method comprising:

(a) scanning the subject in a first direction relative to the subject to take image data of a first plurality of slices, the image data of the first plurality of slices having a low resolution in the first direction and a high resolution in directions orthogonal to the first direction;

(b) scanning the subject in a second direction relative to the subject which is different from the first direction to take image data of a second plurality of slices, the image data of the second plurality of slices having a low resolution in the second direction and a high resolution in directions orthogonal to the second direction;

(c) registering the first plurality of slices with the second plurality of slices to define a matrix of isotropic, high-resolution voxels having unknown high-resolution voxel values; and

(d) [fusing the first plurality of slices with the second plurality of slices] solving for the unknown high-resolution voxel values in the matrix defined in step (c) in accordance with the image data taken in steps (a) and (b) to form the image.

12. (Amended) The method of claim [11] 1, wherein step (d) comprises treating the image as a linear combination of at least two low-resolution functions [having the low resolution] and deriving the [function] unknown high-resolution voxel values from the image data of the first and second pluralities of slices.

28. (Amended) A system for forming an isotropic, high-resolution, three-dimensional image of a subject, the system comprising:

scanning means for (i) scanning the subject in a first direction relative to the subject to take image data of a first plurality of slices, the image data of the first plurality of slices having a

low resolution in the first direction and a high resolution in directions orthogonal to the first direction, and (ii) scanning the subject in a second direction relative to the subject which is different from the first direction to take image data of a second plurality of slices, the image data of the second plurality of slices having a low resolution in the second direction and a high resolution in directions orthogonal to the second direction; and

computing means for (i) registering the first plurality of slices with the second plurality of slices to define a matrix of isotropic, high-resolution voxels having unknown high-resolution voxel values and (ii) [fusing the first plurality of slices with the second plurality of slices] solving for the unknown high-resolution voxel values in the matrix defined by the computing means in accordance with the image data taken in the first and second directions by the scanning means to form the image.

39. (Amended) The system of claim [38] 28, wherein the computing means treats the image as a linear combination of at least two low-resolution functions [having the low resolution] and deriving the [functions] unknown high-resolution voxel values from the image data of the first and second pluralities of slices.